



MOLYCORP RI/FS Informational Bulletin

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Results of EPA's Residential Garden Sampling

Introduction

The United States Environmental Protection Agency (EPA) is conducting a Remedial Investigation and Feasibility Study (RI/FS) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) at the MolyCorp molybdenum mine site (MolyCorp Site), located near the village of Questa (Questa), New Mexico. As part of this RI/FS, EPA collected vegetables from three private gardens in Questa in August 2003 for testing.

The private gardens were selected for sampling because:

- they were in close proximity and downwind of the MolyCorp Tailings Facility (where mine tailings were disposed)
- they were irrigated via the local *acequia* ditches

These gardens were thought to be the most likely of any to have been affected by metals (for example, manganese, zinc, molybdenum) and/or other mine-related constituents from tailings.

Analysis of the vegetable samples provides information about whether metals and other inorganic chemicals in

soil and irrigation water might be present in homegrown vegetables and at what levels. To complement the analysis of vegetable samples, samples of both garden soils and irrigation water were also collected and analyzed. These data

help to identify the source of the metals and other inorganic chemicals that might be found in the vegetables.

This information was used by EPA to evaluate whether the inorganic chemicals

present in garden soils and irrigation water were taken up by garden vegetables from soil or water in quantities that could pose a risk to public health. The evaluation will be part of EPA's comprehensive risk assessment for the MolyCorp Site. In the interim, the EPA performed a preliminary evaluation of garden vegetable consumption to determine whether the garden vegetables are safe to eat.

The findings indicate that homegrown vegetables from the three gardens sampled in Questa are safe to eat because the levels of metals and other constituents are consistently below concentrations that might cause harmful effects to people



Garden Lettuce Sampled for Study

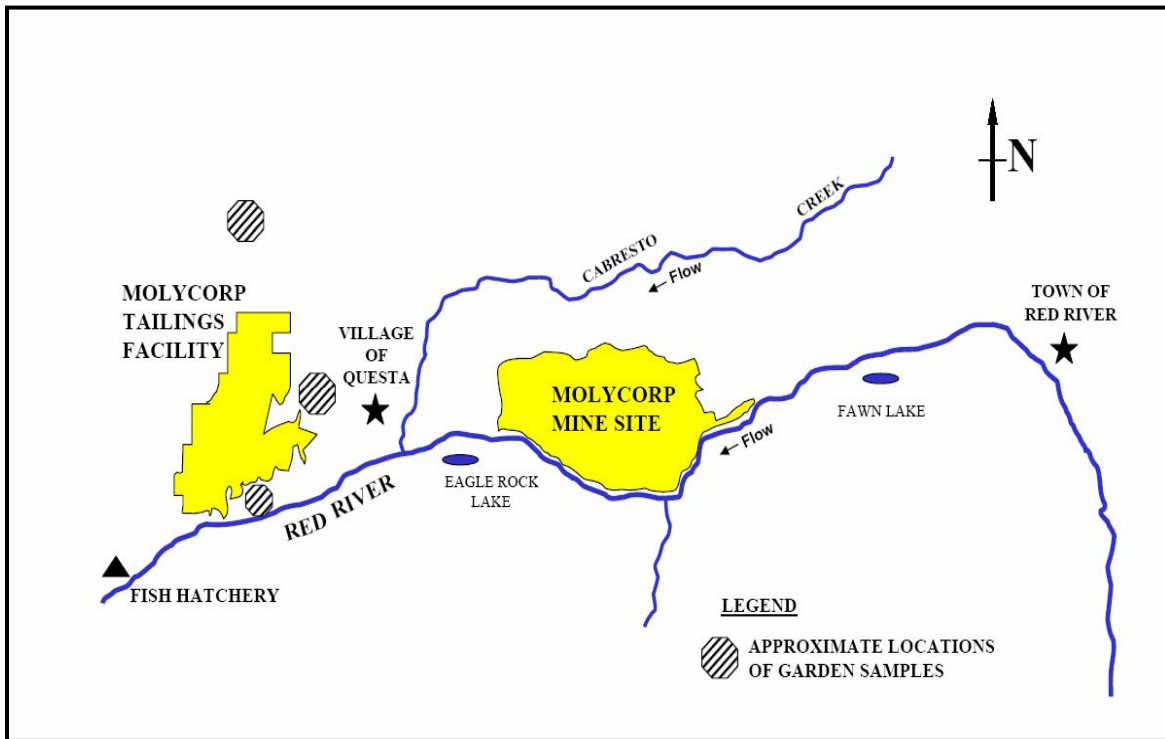


Figure 1. Residential Garden Sampling Locations

Which gardens were sampled?

The private gardens from which vegetable, soil, and water samples were collected are located south, east, and northeast of the Tailings Facility (Figure 1). For reasons of privacy, the specific gardens are not identified. Samples were also taken from two organic farms (reference gardens), located outside of Questa, to provide data on typical levels of metals and other constituents.

All vegetables contain metals and other inorganic chemicals. Therefore, knowing what levels of metals and inorganics are typical is critical to evaluating levels of constituents found in Questa garden vegetables. One organic farm is in Cerro, about 5 miles north of the Tailings Facility. The other is located in Arroyo Seco, about 10 miles south of Questa. In addition, organic-grown produce purchased from a supermarket in Taos was also tested.

What was tested in the samples?

Vegetables, soil, and irrigation water samples were tested primarily for metals such as manganese, aluminum, and molybdenum that are found at elevated concentrations in mine tailings and soils affected by tailings.

How many samples were taken?

A total of 17 vegetable (green bean, lettuce, and zucchini), 8 soil, and 12 irrigation water samples were analyzed.

How was the sampling conducted?

The most common homegrown vegetables, (green beans, zucchini, and lettuce) were sampled from each garden, except for one garden where no lettuce was grown. Soil samples were collected



Green Beans Sampled as Part of the Study

throughout the root zone (6 to 8 inches) in the same area of the garden where vegetables were collected. Irrigation water was collected at a point as close as possible to the garden. The garden south of the Tailings Facility is currently irrigated with Red River water from an *acequia* ditch. The other two Questa gardens are irrigated with water from Cabresto Creek. The organic farms in Cerro and Arroyo Seco are watered with local well water.

Garden owners also answered a questionnaire that provided information about their personal vegetable consumption, including:

- how much homegrown garden produce their family consumes
- how often they eat homegrown vegetables
- whether the vegetables are washed or not

This study concluded that the vegetables grown in the three gardens in Questa and in the reference gardens are safe to eat

before consumption

- how the vegetables are prepared (eaten fresh or cooked)
- whether and what type of fertilizers or pesticides were used in the garden

Answers to this questionnaire were used in EPA's preliminary garden vegetable consumption risk evaluation.

In order to duplicate the most common vegetable preparation method, all vegetable samples were washed with tap water from Questa before they were individually bagged and shipped to an EPA-approved analytical laboratory for testing.

What are the results of the study?

Vegetables collected from these gardens and from the Taos supermarket have similar concentrations of most metals and

other constituents and that all measured concentrations were well below levels that would be cause for concern for health impacts.

Of note were concentrations of molybdenum and manganese in green beans collected from two of the Questa gardens. These concentrations were higher than those found in vegetables collected from the reference gardens or the Taos supermarket. This observation may suggest some mine-related impact in these two gardens, although other sources of manganese and molybdenum, including fertilizers, could also explain these findings.

The highest molybdenum concentrations in green beans were found in Questa gardens 1 and 2, with 2.1 and 0.8 milligrams per kilogram (mg/kg), respectively. While these concentrations are higher than the molybdenum concentrations measured in beans from the reference gardens, they are below the 4.9 mg/kg level that

would be cause for concern based on EPA's initial analysis of vegetable data and information on vegetable consumption from gardener questionnaires (Figure 2).

The highest manganese concentrations in beans were found in Questa gardens 2 and 3 at 9.5 and 6.9 mg/kg, respectively. These manganese concentrations are not of concern (Figure 3).

The results of the study also found that green beans from both Questa and reference gardens generally had higher concentrations of molybdenum and manganese than lettuce or zucchini.

Typically, no discernible differences in metals concentrations were detected in zucchini and lettuce between the Questa and reference gardens. However, in some isolated cases, metals concentrations were higher in vegetables from the reference gardens than from the Questa gardens (e.g., zinc in beans, and manganese and zinc in zucchini).

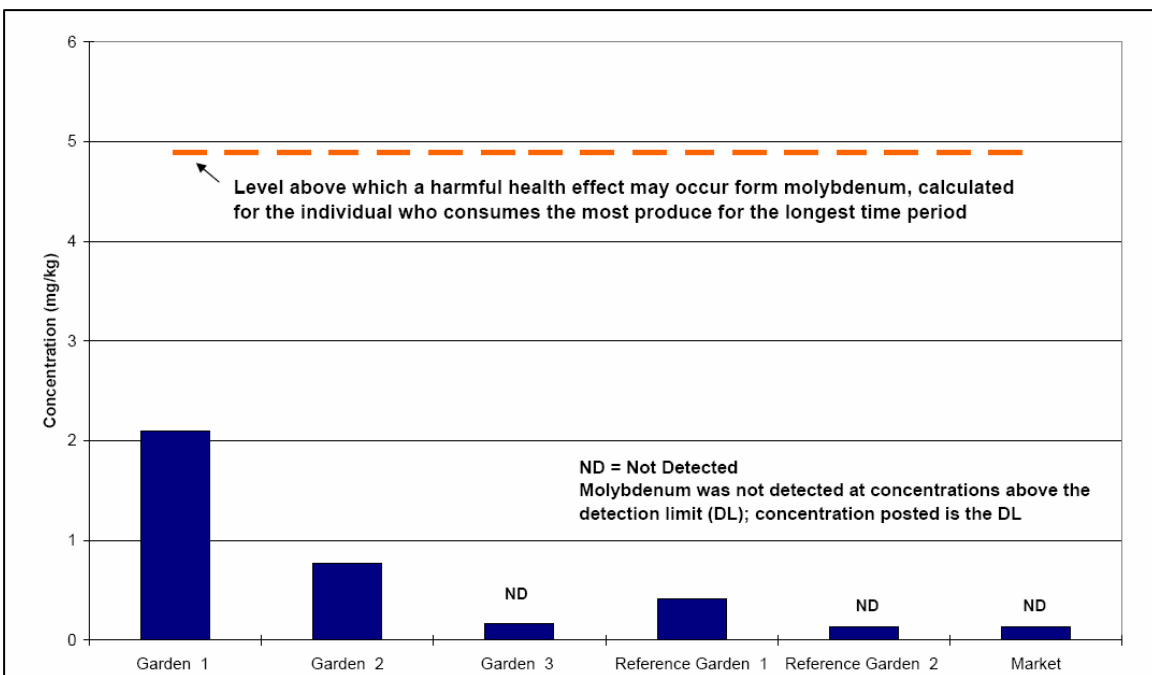


Figure 2. Garden Sampling Results — Molybdenum Concentrations in Beans

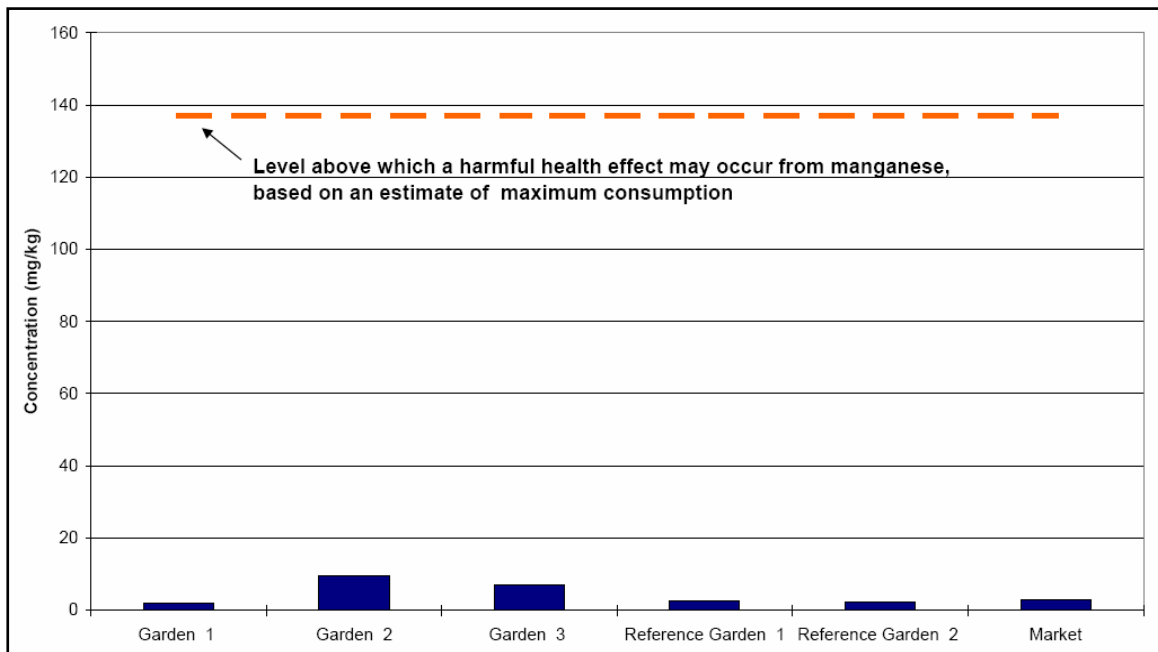


Figure 3. Garden Sampling Results — Manganese Concentrations in Beans

Analyses of garden soil and irrigation water indicate that higher molybdenum concentrations occur in the soil and irrigation water in Questa garden 1, located south of the Tailings Facility than in the other two Questa gardens and reference gardens. Irrigation water in this same garden was also higher in manganese concentrations, while the level of manganese in soil was very similar to the other gardens.

How will EPA use this information to look at potential human health risk?

As part of the garden vegetable evaluation, EPA conducted a preliminary risk evaluation using the measured concentrations in each garden vegetable, and the preparation and consumption information supplied by

the local gardeners. The preliminary risk evaluation used standard EPA methods to estimate risks associated with eating homegrown vegetables.

EPA's findings indicate that homegrown vegetables from the three gardens sampled in Questa are safe to eat because levels of metals and other constituents are consistently below concentrations that might suggest harmful affects to people. Because EPA expects the gardens that were sampled to be among those most likely to be affected by mine-related constituents, EPA has no reason at this time to believe that other gardens in the area would pose a higher risk to human health.

The results of this study will also be used in the EPA's comprehensive human health risk assessment currently in progress for the entire MolyCorp Site.

Additional Sources of Site Information

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EPA Informational Websites

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